RUGID

RUG3 Applications

WATER SYSTEM TELEMETRY

Tank sites
Filter plants
Booster stations
Pump controls
Lake and stream monitoring

WEATHER MONITORING

Flash flood warning
Snowpack monitoring
Reservoir levels
Stream flows
ALERT or 2-way
Cloud seeding

WASTEWATER SYSTEM TELEMETRY

Lift stations
Treatment plants
Pump controls
Effluent monitoring
Chemical feeds

SHIP MONITORING

Mothball fleet
Intrusion alarms
Flood alarms
Fire alarms

PETROLEUM SYSTEMS

Wellhead safety
Tank farms
Gas flow
Fuel level/flow
Spill detection

IRRIGATION SYSTEMS

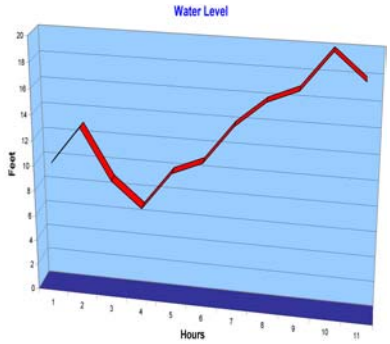
Remote pump control
Alarm monitoring
Pivot control

CANALS

Flow rates
Gate position
Valve control

DATA LOGING

524K Bytes
Non Volatile Flash Memory
Stores a mix of Time Tags,
Integers and Floating point.



INDUSTRIAL

Process monitoring
Gas leak detection
Test monitoring
Alarm monitoring
Process control

DAM SAFETY

Flood warning
Dam integrity
Inflow/outflow monitoring
Gate position

RUG3 Features

OPERATOR INTERFACE

The built in operator interface uses familiar prompts and engineering units display, eliminating operator guesswork and code memorization. The 2x16 character backlit display can scroll through several screens of information with a single keypress.

The sealed tactile keyboard enables setpoint changing.

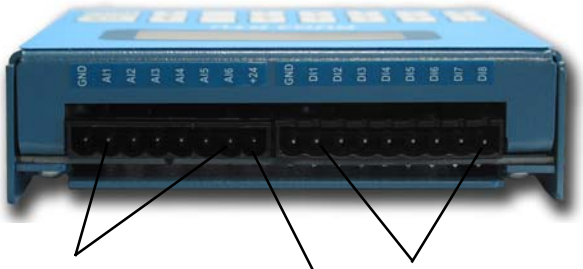
LOW POWER CONSUMPTION

The RUG3 draws as little as 3 milliamps in full operation. This includes the display on, running at full speed and with the modem working. The relays, backlight, and loop supply increase the power draw.

RUG3 CPU

The CPU is integrated and has 2K of battery backed RAM, 60K of program FLASH and 512K of logging memory. The RUG3 is configured using preprogrammed modules in the same manner as the RUG5 and RUG9. The operating system can be field upgraded using the latest version available at no charge from our website (www.rugidcomputer.com).

RUG3 Top View



6 Analog Inputs
AI 6 can be configured
as an Anemometer Input

8 Digital Inputs
24 Volt Loop Supply

BUILT IN I/O

The RUG3 includes a wide variety of I/O. Six analog inputs are available with one being selectable as an anemometer input. The analog inputs are 0-5v or 4-20ma, 12 bit resolution.
Eight digital inputs are standard and they can be used for pulse counting (128pps) and pulse duration detecting (4ms).
Four 10 amp relay outputs are provided. The RUG3 also features a dedicated port for loading programs and a modem/RS232 port for communication purposes. A 24v loop supply is standard.

RUG3 Bottom View

Program loading port

Modem/RS232 port

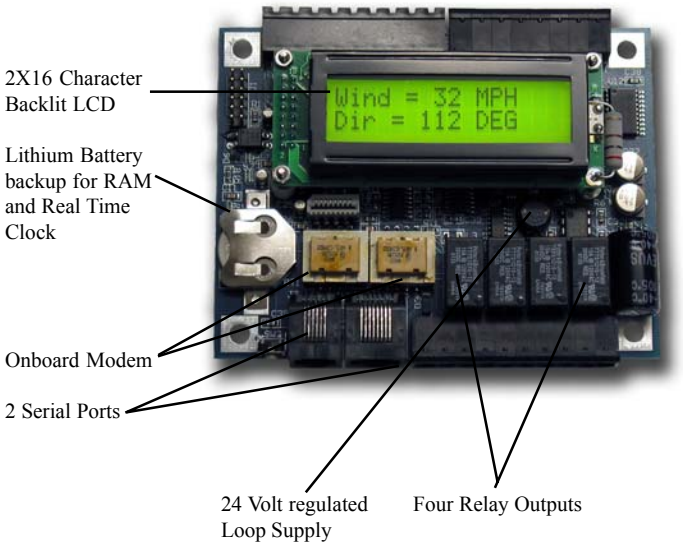
12VDC Power Connection

4 Relay Outputs

RUG3 Styles

RUG3BL (Board & LCD)

8 Digital Inputs 6 Analog Inputs

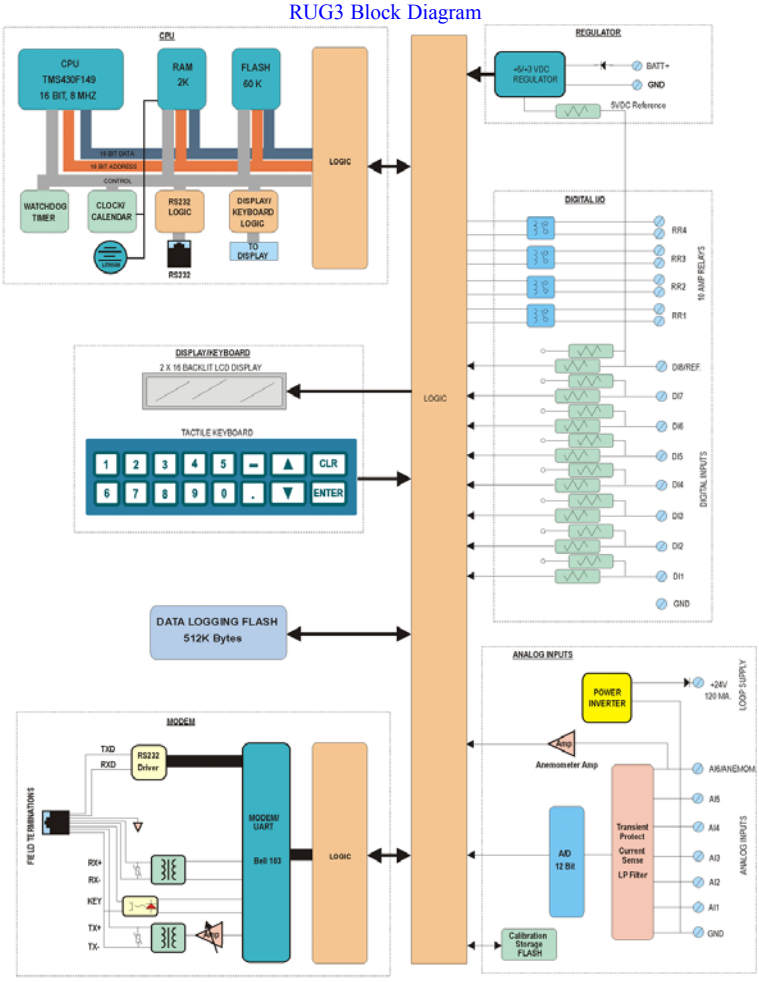


RUG3P (Panel Mount)

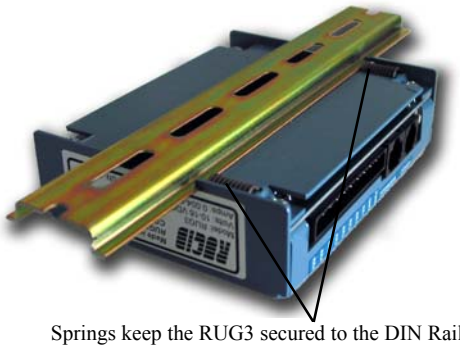
RUG3D (DIN Rail Mount)

RUG3C (DIN Rail Mount No Display)

RUG3 Block Diagram



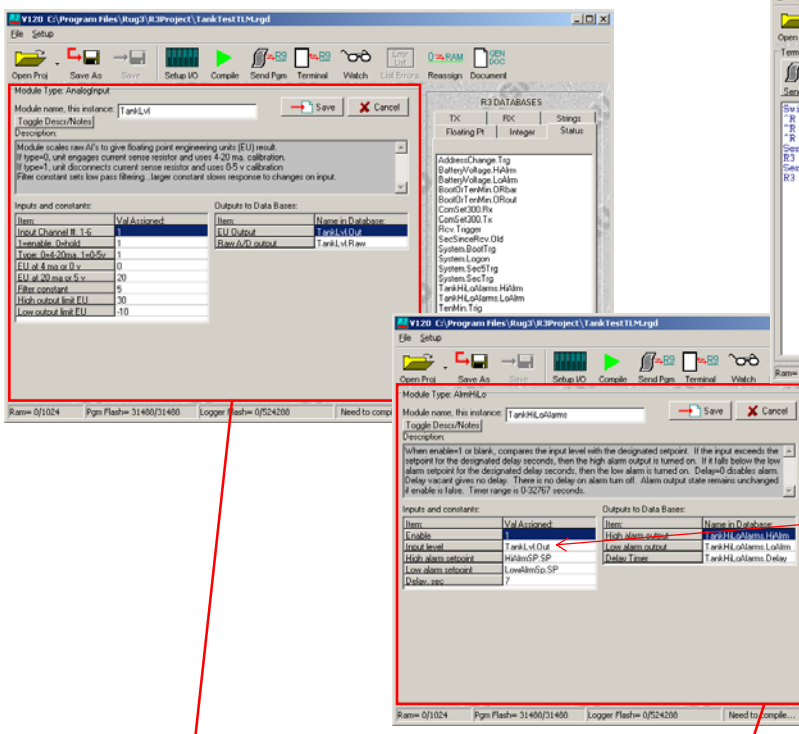
The RUG3 easily slides onto a DIN rail. No tools are required for mounting or removing it.



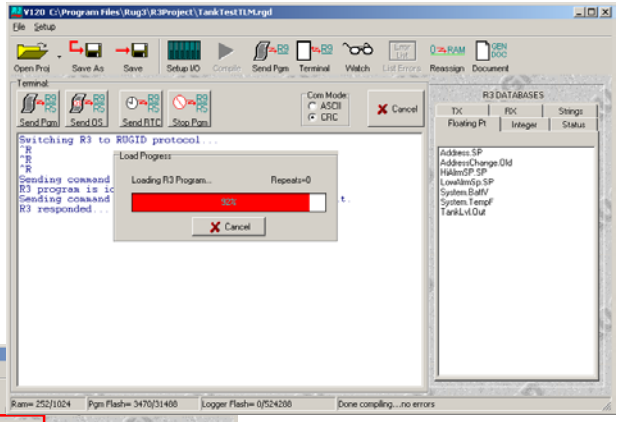
Springs keep the RUG3 secured to the DIN Rail.

Put RUG3 to Work

Step 1: Setup I/O properties. The name you enter becomes signal name in the database.



Step 3: Send program to RUG3



Step 2: Design control strategy, drag inputs from databases or type in values.

RUG3 Preprogrammed Modules

I/O MODULES
- Analog input
- Anemometer
- Digital input counter
- Digital output alarm
- Digital input
- Digital output
- Get user value
- Message to display
- Pulse duration input
- Pulse duration output
- Pulse to flow
- Setpoint
- Shaft Encoder Input
- System setup

MATH
- Bits to Numeric
- Constant
- Cosine
- Float to integer
- Flow CipolletiRect
- Flow AGA3
- Flow container
- Flow convert/dropout
- Flow H flume
- Flow Palmer-Bowlus
- Flow Parshall
- Flow Q=A*(H+B)**C
- Flow trapez flume
- Limit
- Low pass filter
- Mask integer
- Numeric to bits
- Numeric to string
- Polynomial Nth order
- Power
- Sine
- Square root
- Tangent
- Trigger to numeric
- Y=A*B
- Y=A-B
- Y=A*B
- Y=A/B
- Y=A*B*C*D*E*F*G*H
- Y=A*B+C*D+E*F+G*H
- Y=A+B*C/D-E
- Y=A+B*exp**(X+C)
- Y=A+B*rand(1)
- Y=A+B+C+D+E+F+G+H
- Y=A+B+C+D-E-F-G-H
- Y=abs(X)
- Y=Log(X)
- Y=Log10(X)
- Y=MX+B
- Y=sqrt(X)
- Y=X^Z (power)

CONTROL
- Alarm hi/low
- AND gate
- Counter
- Count up/down rellover
- Deadband
- Delay timer
- Exclusive OR
- FIFOQueue
- Flip flop
- Flip flop RS
- HOA
- HOA2
- Intrusion
- Latch float value
- Latch integer value
- Latch on bit change
- Latch string
- Lead lag seq4
- Lookup switch
- Mismatch latch
- Off delay
- On delay
- OR gate
- OR gate latched
- PID
- Poke
- Poke many
- Pulse generator
- Pump down controller
- Pump up controller
- Pump up/dn controller
- Rate of change
- Read realtime clock
- Sequencer timed #2
- Sequencer timed
- Sequencer up/down
- Sequencer out (expander)
- Set realtime clock
- String switch
- String switch by bits
- Sync to RTC
- Toggle
- Trigger every X seconds
- Trigger generator
- Trigger on change
- Trigger on change many
- Trigger on keymany
- Trigger on realtime clock
- Trigger on bit then clear
- Value test

STATISTICS
- Average value
- Log many
- Max value
- Min value
- Totalize event
- Totalize flow
- Totalize time

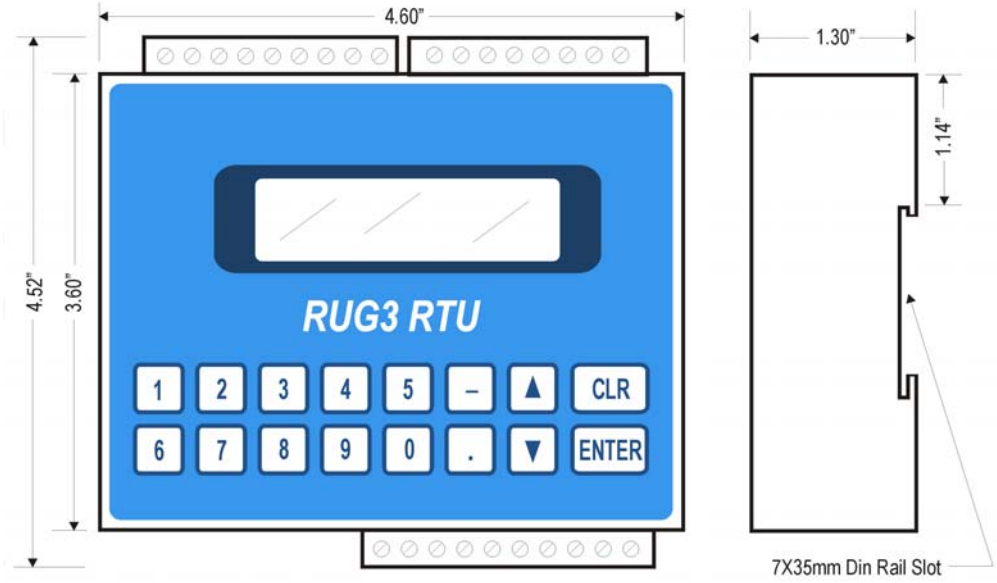
COMMUNICATIONS
- Communications setup
- Cycle display
- Get string from port
- Poll
- Quiescent controller
- Send Alert Data
- Send string to port
- Sequenced poller
- Send string to port
- Trigger on receive

MAJOR BLOCKS
- Display definition
- Ladder logic
- Modbus slave
- R6/R9 CRC secure comm
- Table setup
- Watch window debugger

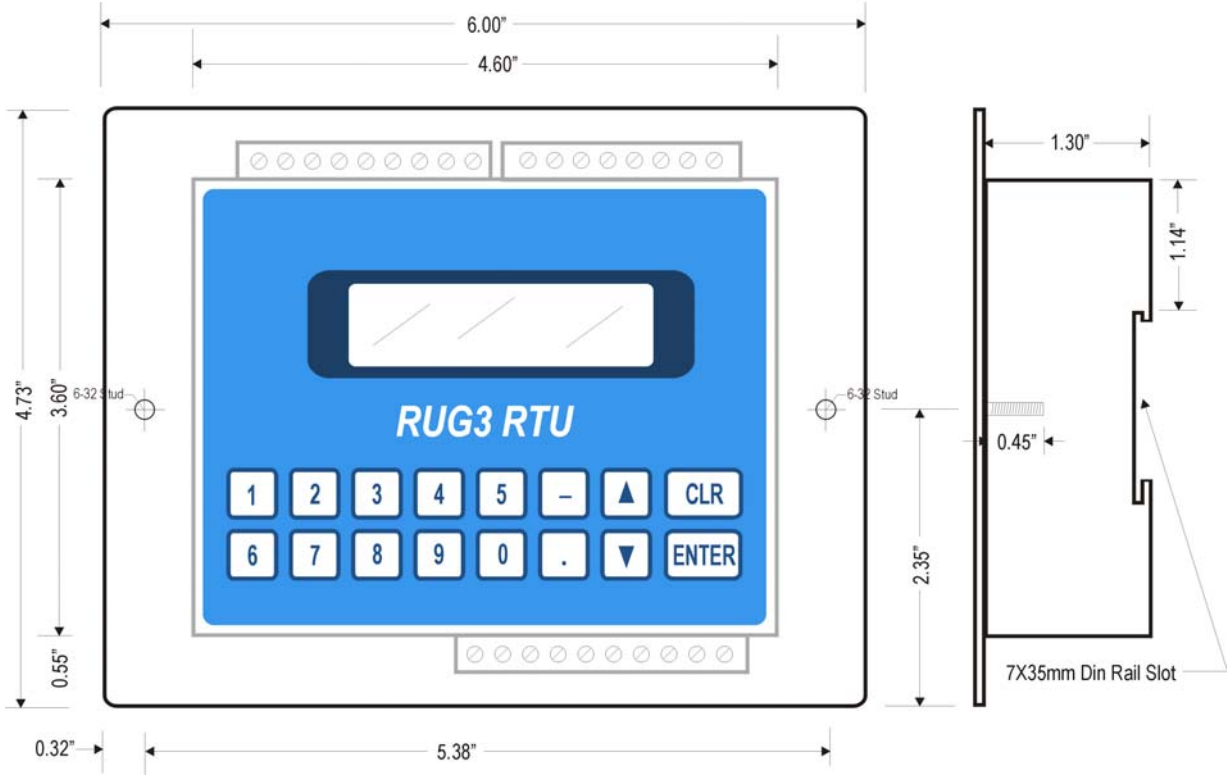
RUGID Computer

RUG3 Dimensions

RUG3 DIN Rail Mount



RUG3 Panel Mount



RUG3 Specifications

LOGIC Family
All low power CMOS

MICROPROCESSOR
16-bit MSP430, 8 Mhz, 16 bit data bus, 16-bit address bus
.

MEMORY
RAM-2 Kbytes battery backed low power static RAM
Program FLASH-60 Kbytes
Logging FLASH-512 Kbytes
Battery Backup-Lithium coin cell backs up RAM & realtime clock calendar min 2 year.

DISPLAY
2 line X 16 char backlit LCD, sunlight readable, backlight switchable by software.

KEYBOARD
16 key sealed tactile membrane with interrupt scanning.

REALTIME CLOCK CALENDAR
Battery backed clock/calendar 0.005% crystal accuracy

OPERATION SECURITY
Watchdog Timer-Hardware timer resets unit .5 seconds after interrupt fails. Cannot be disabled
Telemetry Watchdog-Resets rcv buffer if no character received within 1 sec.
Brownout Detector-Halts process if logic voltage falls below 2.7 V, restarts when voltage rises to 3 V.

AUTOBOOTING
Auto startup on power application.

ANALOG INPUTS-12 bit
6 channel per board, 12 bit res., successive approx, 4-20 ma. or 0-5 v. Factory calibrated.

DIGITAL INPUTS
Status- 8 chan, dry contact compatible, self powered.
Pulse Counting-all DI count 128 PPS
Pulse Duration Detecting-all can convert pulses to analog with 4ms resolution.
Shaft Encoder-DI's in pairs used the decode shaft encoders.

DIGITAL OUTPUTS
4 ch, 10 amp relays
Pulse Duration Outputs-Relays can generate pulse width modulated or one shot signals with 4 ms res.

ANEMOMETER INPUT
AI6 connected to clipping amp, counted to derive windspeed

REFERENCE OUTPUT
2.5 VDC reference available to power potentiometers, shares pin with DI8.

INSTRUMENT POWER
Loop supply switchable to battery voltage and can be switched on/off by software. Diode isolated.

SERIAL PORTS
One programming/gen purpose port plus one RS232/ modem port

MODEM
Bell 103 standard/ALERT standard

Radio Interface
4-wire audio, adj. gain, xformer isolated, optically isolated key line. Low tones mode for splinter chan.

Phone Line Interface
4 wire audio adjustable gain, transformer isolated

Transmit power
0-4Vp-p, software adjustable in 256 steps

COMMUNICATIONS
ASCII-standard
R9 protocol-Background CRC gen/decode, variable length messages, user defined message lengths. Can combine status, integer, float, in any message.
ALERT protocol-standard
Eavesdrop Mode-R9 protocol, any RTU can accept data passing between any other stations
Peer to Peer- Full RTU to RTU or RTU to master or master to RTU messaging
Store and Forward- Sending station sets path through up to 3 intermediary stations
Address Range-1 to 254

POWER INTERFACE
12 VDC +/-20%, diode isolated. 4 ma normal operation (relays, loop supply and relays off) to 440 ma. max,

LOOP SUPPLY
Built in switchable regulated 24 VDC +/-5%, 120 ma

I/O CONNECTIONS
All I/O uses removable rising cage screw headers in banks of up to 10 each, 14 ga wire. Modem signals use RJ45 jack

SOFTWARE
Storage-operating system and all user configuration and programming stored in nonvolatile flash memory. Flash loader stored in flash protected boot block.
Security-parameter voting and memory integrity test on boot up, CRC gen/ detect on serial ports. Program loading CRC protected.
Scanning-Built in software scans all I/O ports, timers, realtime clock.

PROGRAMMING
Modules-applications use precompiled modules resident in flash memory where programmer interconnects modules and sets properties using supplied Win95/98/NT/XP program. No procedural programming required for most applications.

LADDER LOGIC
Ladder logic is built in to the WIN95/98/NT/XP configuration program to handle misc controls

DATA LOGGING
Logs floating point, integer and status samples with time tags to onboard flash eeprom. 128K samples and time tags. Can dump logs to serial port as comma delimited ASCII.

VARIABLES
Supports 16 bit integer, 32 bit floating point, boolean, strings.

ERROR MESSAGES
Configuration program handles all setup errors. Run time software is self protecting... no run time errors.

ENCLOSURE
16 ga. steel, blue powder coat DIN rail mountable. Case: 4.6 X 3.6 X 1.3 in. Panel mount flange 6.0 X 4.75 In.

TEMPERATURE RANGE
-40 to +85 deg. C logic
-20 to +60 C LCD display

DOCUMENTATION
210 page manual on CD.

WARRANTY
1 year std limited warranty

REPAIR
Nominal 24 hour turnaround

RUGID Computer, Inc: 6305 Elizan Dr. NW, Olympia WA, 98502
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www.rugidcomputer.com

RUG3P Shown Actual Size

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